

**CLAIMS AS AMENDED HEREIN**  
**WITH STATUS IDENTIFIERS AND MARKINGS TO SHOW CHANGES:**

The following claims replace all prior versions of the claims in this application:

**WHAT IS CLAIMED IS:**

1 **Claim 1 (currently amended):** A method for forming a dense Si-C-B-N composite, said  
2 method comprising:

3 (a) mechanically activating a powder mixture comprised of silicon nitride, silicon  
4 carbide, and boron nitride; and

5 (b) consolidating said powder mixture so activated into a continuous mass by  
6 compressing said powder mixture so activated in the presence of 0 to 1% by weight of  
7 metal oxide densification aids relative to said powder mixture, while passing an electric  
8 current through said powder mixture, to achieve a fused Si-C-B-N mass comprised of  
9 crystals less than 100 nanometers in diameter.

1 **Claim 2 (currently amended):** The method of claim 1 wherein said powder mixture of step (a)  
2 is substantially amorphous.

1 **Claim 3 (original):** The method of claim 1 wherein said crystals of said fused Si-C-B-N mass  
2 are less than 50 nm in diameter.

1 **Claim 4 (currently amended):** The method of claim 1 wherein any metal densification aid  
2 present in step (b) is from 0 to 0.5% by weight of said powder mixture of step (b).

1 **Claim 5 (currently amended):** The method of claim 1 wherein any metal densification aid  
2 present in step (b) is from 0 to 0.1% by weight of said powder mixture of step (b).

1 **Claim 6 (original):** The method of claim 1 wherein step (b) is performed in the absence of  
2 metal oxide densification aids.

1 **Claim 7 (currently amended):** The method of claim 1 wherein said powder mixture of step (a)  
2 consists essentially of from about 10 to about 60 parts by volume silicon, from about 10 to about  
3 60 parts by volume carbon, from about 10 to about 60 parts by volume nitrogen, and from about  
4 2 to about 30 parts by volume boron, based on a total of 100 parts by volume of said powder  
5 mixture of step (a).

1 **Claim 8 (currently amended):** The method of claim 1 further comprising forming said powder  
2 mixture of step (a) by combining decaborane with a polyorganosilazane, followed by  
3 crosslinking and pyrolysis.

1 **Claim 9 (original):** The method of claim 8 wherein said polyorganosilazane is a  
2 polyureasilazane.

1 **Claim 10 (currently amended):** The method of claim 1 wherein step (b) comprises  
2 compressing said powder mixture so activated at a pressure of about 10 MPa to about 200 MPa  
3 and a temperature of about 900°C to about 3,000°C, and said electric current is a pulsed direct  
4 current of about 1,000 A/cm<sup>2</sup> to about 10,000 A/cm<sup>2</sup>.

1 **Claim 11 (original):** The method of claim 10 wherein said pressure is about 40 MPa to about  
2 100 MPa.

1 **Claim 12 (original):** The method of claim 10 wherein said temperature is about 1,000°C to  
2 about 2,000°C.

1 **Claim 13 (original):** The method of claim 10 wherein said pulsed direct current is about 1,500  
2 A/cm<sup>2</sup> to about 5,000 A/cm<sup>2</sup>.

1 **Claim 14 (original):** The method of claim 1 wherein step (b) is performed to achieve a fused  
2 mass with a density of at least 95% relative to a volume-averaged theoretical density.

1 **Claim 15 (original):** The method of claim 1 wherein step (b) is performed to achieve a fused  
2 mass with a density of at least 98% relative to a volume-averaged theoretical density.

1 **Claim 16 (original):** The method of claim 1 wherein step (b) is performed to achieve a fused  
2 mass with a density of at least 99% relative to a volume-averaged theoretical density.

1 **Claim 17 (original):** The method of claim 1 wherein step (a) comprises milling said powder  
2 mixture by high-energy ball milling.

1 **Claim 18 (original):** The method of claim 17 wherein said high-energy ball milling is  
2 performed with silicon nitride milling balls in an oscillating mill at about 6 or more impacts per  
3 second and a charge ratio of at least about 10:4.

1 **Claim 19 (withdrawn):** A dense composite of silicon nitride, silicon carbide, and boron nitride,  
2 consisting essentially of crystals less than 100 nm in diameter and containing 0 to 1% by weight  
3 of metal oxide densification aids, produced by a process comprising:

4 (a) mechanically activating a powder mixture of silicon nitride, silicon carbide,  
5 and boron nitride; and

6 (b) consolidating said powder mixture into a continuous mass by compressing  
7 said powder mixture in the presence of 0 to 1% by weight of metal oxide densification  
8 aids while passing an electric current through said powder mixture, to achieve a fused  
9 Si-C-B-N mass comprised of crystals less than 100 nanometers in diameter.

1 **Claim 20 (withdrawn):** The composite of claim 19 wherein said powder mixture of step (a) is  
2 substantially amorphous.

1 **Claim 21 (withdrawn):** The composite of claim 19 wherein said fused mass consists of  
2 particles less than 50 nanometers in diameter.

1 **Claim 22 (withdrawn):** The composite of claim 19 wherein step (b) is performed in the  
2 presence of 0 to 0.5% by weight of metal oxide densification aids.

1 **Claim 23 (withdrawn):** The composite of claim 19 wherein step (b) is performed in the  
2 presence of 0 to 0.1% by weight of metal oxide densification aids.

1 **Claim 24 (withdrawn):** The composite of claim 19 wherein step (b) is performed in the absence  
2 of metal oxide densification aids.

1 **Claim 25 (withdrawn):** The composite of claim 19 wherein said powder mixture consists  
2 essentially of from about 10 to about 60 parts by volume silicon, from about 10 to about 60 parts  
3 by volume carbon, from about 10 to about 60 parts by volume nitrogen, and from about 2 to  
4 about 30 parts by volume boron, totaling 100 parts by volume of said powder mixture.

1 **Claim 26 (withdrawn):** The composite of claim 19 wherein said powder mixture is formed by  
2 combining decaborane with a pyrolysis product of a polyorganosilazane in an inert atmosphere.

1 **Claim 27 (withdrawn):** The composite of claim 26 wherein said polyorganosilazane is a  
2 polyureasilazane.

1 **Claim 28 (withdrawn):** The composite of claim 19 wherein step (b) comprises compressing  
2 said powder mixture at a pressure of about 10 MPa to about 200 MPa and a temperature of about  
3 900°C to about 3,000°C, and said electric current is a pulsed direct current of about 1,000 A/cm<sup>2</sup>  
4 to about 10,000 A/cm<sup>2</sup>.

1 **Claim 29 (withdrawn):** The composite of claim 28 wherein said pressure is about 40 MPa to  
2 about 100 MPa.

1 **Claim 30 (withdrawn):** The composite of claim 28 wherein said temperature is about 1,000°C  
2 to about 2,000°C.

1 **Claim 31 (withdrawn):** The composite of claim 28 wherein said pulsed direct current is about  
2 1,500 A/cm<sup>2</sup> to about 5,000 A/cm<sup>2</sup>.

1 **Claim 32 (withdrawn):** The composite of claim 19 wherein step (b) is performed to achieve a  
2 fused mass with a density of at least 95% relative to a volume-averaged theoretical density.

1 **Claim 33 (withdrawn):** The composite of claim 19 wherein step (b) is performed to achieve a  
2 fused mass with a density of at least 98% relative to a volume-averaged theoretical density.

1 **Claim 34 (withdrawn):** The composite of claim 19 wherein step (b) is performed to achieve a  
2 fused mass with a density of at least 99% relative to a volume-averaged theoretical density.

1 **Claim 35 (withdrawn):** The composite of claim 19 wherein step (a) comprises milling said  
2 powder mixture by high-energy ball milling.

1 **Claim 36 (withdrawn):** The composite of claim 19 wherein said high-energy ball milling is  
2 performed with silicon nitride milling balls in an oscillating mill at about 6 or more impacts per  
3 second and a charge ratio of at least about 10:4.